



$$\begin{array}{c|c|c|c|c} 1 & 2 & 3 & 4 & 5 \\ \hline 4 & 9 & 10 & 6^{10} & 10 \end{array}$$

1. Дано:

$$S_1 = 0,5 S_2$$

$$S_3 = ?$$

Решение:

d - это промежуток

$$S_1 = \frac{gt^2}{2}$$

$$S_2 = \frac{g(t-d)^2}{2}$$

$$dt = \frac{1}{2} \left(1 - \frac{\sqrt{2}}{2}\right)$$

$$S_3 = \frac{g(t-2d)^2}{2}$$

$$S_3 = S_1 \cdot d^2$$

$$S_3 = \frac{gt^2}{2} \cdot \left(1 - \frac{\sqrt{2}}{2}\right)^2 =$$

$$= S_1 (1 - \sqrt{2} + 0,5) \approx 0,09 S_1$$

Ответ:  $0,09 S_1$ 

(30)

2. Дано:

$$m = 110 \text{ м}$$

$$m_1 = 20 \text{ м}$$

Решение:

$$F_1 - m_1 g = 0$$

$$F_1 + \rho_0 V g - (m + \rho_2 V) g = 0$$

$$p_2 = 0,18 \frac{\text{мг}}{\text{м}^3}$$

$$p_6 = 1,2 \text{ г} \frac{\text{мг}}{\text{м}^3}$$

$$V_2 = 2V_1$$

$$V - ?$$

$$k - ?$$

$$g(p_6 V + m + p_2 V) = 0$$

$$p_6 V + m + p_2 V = 0$$

$$-m = p_6 V + p_2 V$$

$$V(p_6 + p_2) = -m$$

$$V = \frac{-m}{p_6 + p_2} = \frac{-1110}{1,29 - 0,18} = 1000 (\text{м}^3)$$

$$V_2 = 2 \cdot 1000 = 2000 (\text{м}^3)$$

$$F_A - p_6 V_2 g - k m_1 g - m_2 g = 0$$

$$p_6 V_2 g - p_2 V_2 g - k m_1 g - m g = 0$$

$$p_6 V_2 - p_2 V_2 - k m_1 - m = 0$$

$$k = \frac{p_6 V_2 - p_2 V_2 - m}{m_1} = \frac{3580 - 380 - 1110}{70}$$

$$= 16 (\text{рубль})$$

Ответ: 16 рублей

5. Дано:

$$P = 200 \text{ Вт}$$

$$m = 1 \text{ кг}$$

$$t_0 = 60^\circ \text{C}$$

$$t_1 = 61^\circ \text{C}$$

$$T = 60^\circ \text{C}$$

$$T_1 = ?$$

Решение:

$$P = \frac{A}{T} = \frac{Q}{T} \Rightarrow T = \frac{Q}{P} = 420$$

$$Q = cm(t_1 - t_0) = 4200 \cdot 1 \cdot 1 = 4200 \text{ Дж}$$

$$T_1 = \frac{Q}{P} = \frac{4200}{200} = 21 (\text{C})$$

Ответ: 21 C

3. Дано:

$$P = 200 \text{ Вт}$$

$$m = 1 \text{ кг}$$

$$t_0 = 60^\circ \text{C}$$

$$t = 69^\circ \text{C}$$

$$T_H = 60^\circ \text{C}$$

$$T_1 = ?$$

Решение:

$$E_4 = P \cdot T_H = 200 \cdot 60 = 12000 \text{ (Дж)}$$

$$Q_1 = cm\Delta t = 4200 \cdot 1 \cdot 1 = 4200 \text{ (Дж)}$$

$$Q_2 = E_4 - Q_1 = 12000 - 4200 = 7800 \text{ (Дж)}$$

$$T = \frac{Q_2}{T_H} = \frac{7800}{60} = 130 \text{ (} \frac{\text{Дж}}{\text{C}} \text{)}$$

$$T_1 = \frac{Q_1}{U_1} = \frac{4200}{130} = 32,3 \text{ (C)}$$

Ответ: 32,3 C

4. Дано:

$$U = 1,5 \text{ В}$$

$$Q = 90 \text{ мкКл}$$

$$R = 10 \text{ Ом}$$

$$r = 15 \text{ Ом}$$

$$t = ?$$

Решение:

$$Q = I t, \quad t = \frac{Q}{I} \quad 2$$

$$I = \frac{U}{R} = \frac{U_1 + U_2 + U_3 + U_4}{r + R_1 + \frac{1}{\frac{1}{R_2} + \frac{1}{R_3}} + \frac{1}{R_4}} = 15 \quad 3$$

$$= \frac{6}{25,15} = 0,24 \text{ А} = 240 \text{ мА}$$

$$t = \frac{90}{240} = 0,375 \text{ с} = 1350 \text{ нс} \quad 1$$

Ответ: 1350 нс

5. Дано:

$$\Delta t_1 = 6^\circ \text{C}$$

$$\Delta t_2 = 4^\circ \text{C}$$

$$k = 3$$

Решение:

$$Q_m = Q_6 + Q_2$$

$$Q_m = Q_6 + Q_{31}$$

$$Q_m = Q_6$$

5. Дано

~~$\Delta t_1 = 6^\circ\text{C}$~~

~~$\Delta t_2 = 4^\circ\text{C}$~~

~~$n = 3$~~

Решение:

$$\begin{cases} qm = \Delta t_1 (c_b m_b + c_a m_a) \\ qm = \Delta t_2 (c_b m_b + 3c_a m_a) \\ qm = c_b m_b \Delta t \end{cases}$$

$$\frac{\Delta t_1 (c_b m_b + c_a m_a) = c_b m_b \Delta t}{\Delta t_2 (c_b m_b + 3c_a m_a) = c_b m_b \Delta t_1}$$

$$\frac{\Delta t - \Delta t_1}{\Delta t - \Delta t_2} = \frac{\Delta t_1}{3\Delta t_2}$$

$$(\Delta t - \Delta t_1) 3\Delta t_2 = \Delta t_1 (\Delta t - \Delta t_2)$$

$$\Delta t_1 \Delta t - \Delta t_1 \Delta t_2 = 3\Delta t_2 \Delta t - 3\Delta t_2 \Delta t_1$$

$$3\Delta t_2 \Delta t_1 - \Delta t_1 \Delta t_2 = 3\Delta t_2 \Delta t - \Delta t_1 \Delta t$$

$$\Delta t_1 \Delta t_2 (3-1) = \Delta t (3\Delta t_2 - \Delta t_1)$$

$$\Delta t = \frac{\Delta t_1 \Delta t_2 \cdot 2}{3\Delta t_2 - \Delta t_1} = \frac{6 \cdot 4 \cdot 2}{3 \cdot 4 - 6} = 8^\circ\text{C}$$

Ответ:  $8^\circ\text{C}$ .

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